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Final thoughts on antibiotic use: wake up call for the oral health care professionals

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ABSTRACT

Antibiotic treatment is a form of pharmacotherapy with the specialty of rendering both etiological and curative action. Dentists traditionally administer antibiotics, to restrain contagions and to handle the prevailing dental ailments. Penicillins have been the drug of choice to be opted by the dental practitioners in their routine dental practice. Prudent application of antibiotics in concoction with surgical therapy is the most pertinent mode to cure odontogenic contagions. Considerable prescriptions of antibiotics are ascribed especially in cases which induce bleeding in the oral cavity. Regardless of the obvious indications, perplexity prevails between the oral health care professional's pertaining to the administration of antibiotics in coalition with dental maneuvers. Dreadful ailments have been cured after the incipience of antibiotics in 1929. Besides it also leads to cumbersome consequences by virtue of its misuse. Irrational usage of antibiotic therapy leads to false positive effects on both health and financial grounds and poses a threat to the microbial resistance. The present communication aims to delineate the absolute indications, consequences of abuse and imperative factors to be considered while prescribing antibiotics in routine dental practice.

1. Introduction

The breakthrough of antibiotics came to existence in 1929 when the Scottish bacteriologist Alexander Fleming, documented on the bactericidal activity of specimens of a penicillium genre^[1]. Antibiotics are the biggest endowment of the 20th aeon to health care industry. These medications are imperative in the sustenance and prophylaxis of contagion in patients at liability of confronting microbial ailment. Majority of the orofacial contagions emanate from the odontogenic contagions and thereby, administration of antibiotics has eventually metamorphosed as a cardinal approach in everyday dental practice. Antibiotics are among the

most frequently prescribed drugs by dentists, who can therefore be said to pronominally contribute to the global consumption of antibiotics. The prime utilization of antibiotics is insinuated in dental practice when the clinical circumstance presents objective evidence. Regardless of the obvious indications, perplexity prevails between the oral health care professionals pertaining to the administration of antibiotics in coalition with dental maneuvers^[1]. Many natural health proficients insure that dentistry is the medical discipline responsible for some of the antibiotics abuse. Dental practitioners ought to be alarmed of the cause reliant to the antibiotic abuse and ameliorate their dexterity in antibiotic prescription. The present communication aims to delineate the absolute indications of antibiotics, dialectics and consequences of misuse and the imperative factors to be contemplated while prescribing antibiotics in heyday dental practice.

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2. Absolute indications of antibiotics

Antibiotic treatment is a form of pharmacotherapy with the specialty of rendering both etiological and curative action. The fundamental principle of antibiotic prophylaxis is to select the appropriate antibiotic, determine the dosage, route of administration and prescribe them for the required duration.

2.1. Antibiotics in endodontic maneuvers

Dentists prescribe medications for the management of multifarious oral conditions, specifically orofacial infections[2]. Administration of antibiotics rationally in concoction with local treatment is the most pertinent mode to cure odontogenic contagions. The endodontic dentistry is considered to acquire abundant medications when compared with its other disciplines[3]. Orofacial contagions do benefit aftermath of the supportive administration of antibiotics; meanwhile these medicaments should also serve as adjutant for explicit maneuvers. Pulpitis and periapical abscess are the accepted clinical perspectives which demand the need of systemic antibiotics[4]. Oral clinicians are urged to prescribe antibiotics without resolving the local factor, whereas many of the endodontic infections do not require the service, if the dialectic factor involved in the contagion is eradicated. The prevailing situation strictly vindicates the utilization of antibiotics after the root canal procedures as unhealthy practice and generates infinitesimal response post-operatively[5,6]. Replete obturation and closure of the pulp space from the oral environment averts the administration of antibiotics. Clinical scenarios where the patients present with an intraoral swelling, due to acute apical abscess do not desire the regimen of systemic antibiotics. Considering the medical status of the patient and if the patient exhibits an extra oral swelling, the antibiotics can be recommended after the debridement of the pulp space with calcium hydroxide. When the pulpal inflammation is confined, the excision of the tissue is acknowledged as the treatment of choice rather than prescribing antibiotics. Most of the dental infections entail a conservative and operative approach towards the management of pulpal and periodontal inflammations like root canal therapy, restorations and removal of the tooth if the prognosis is unfavorable.

2.2. Antibiotics in oral surgical procedures and infective endocarditis

Infective endocarditis is a critical contagion transpiring on the endothelial shroud of the heart, particularly at the valves. Dental procedures such as tooth extraction, periodontal surgery, scaling, rubber dam placement, and root canal therapy can induce bacteremia, but these maneuvers are trigger factors for few cases of endocarditis. Antibiotic aid is strongly imputed in patients with high risk of infective endocarditis, where it's administered as prophylactic antibiotics[7]. The American Health Association authenticates that all dental manoeuvres that comprehend operation of gingival tissue or the periapical region of teeth or breaching of the oral mucosa deserve antibiotic prophylaxis[8]. Oral health care professionals advise medications for clinical situations pertaining to endodontic, oral surgical, and periodontal conditions. Considerable prescriptions of antibiotics are ascribed especially in cases which induce bleeding in the oral cavity. The clinical practice guidelines for antibiotic prophylaxis acknowledge that oral surgical procedures like orthognathic surgery, major preprosthetic surgery and extensive tumor surgery demand the need of an antibiotic[9]. Selected antibiotic should be persuasive over the microbial flora which is basically found in the oral cavity, like *Staphylococcus*, *Streptococcus*, enteric and anaerobic bacteria. Penicillin and its derivatives gratify the above requirements and provide a curative action by eliminating the bacterial[10].

As a matter of course, removal of tooth is a routine surgical procedure carried out in the dental practice. Antibiotics are recommended to medicate the major oral surgical procedures, but the former maneuver implicates a necessity only in vulnerable patients. Furthermore, researches admit that the plausible infection rate succeeding third molar elicitation is considerably meager when compared with the other dentition[11,12]. Traditional applications of antibiotics fail to ameliorate the infection rate following the extraction of third molar. Conjointly, couple of studies do ratify the former statement and deny its usance preceding last molar evulsion[13,14]. Poeschl *et al.*, reported that the prevalence of surgical infection was negligible, aftermath on the antibiotic prophylaxis in minor oral surgical procedures[15,16]. On the contrary, literature also mutually supports the service of antibiotics following impacted molars[17–22]. Martinez *et al.*, documented the incorporation of postoperative antibiotics (amoxicillin/clavulanate) as successful therapy in ostetotomy cases. The researchers do justify that the prophylaxis is mandatory for dentoalveolar surgery only in complicated circumstances,

especially in total osseous impaction[23]. Present references corroborate the administration of antibiotics to the sound inmates as an absolute contradiction, owing to the inessential threat induced in patients' well-being. Furthermore, pre/post operative administration of antibiotics fails to produce amelioration in the anticipated symptoms such as pain, swelling on the aftermath of the impaction[24]. With the existing controversies in the antibiotic therapy of oral surgical procedures, adhering to the imperative protocol such as a clean surgery eradicates the necessity of the antibiotic administration in major cases. The excluding patients who require the service of antibiotics during intra oral surgical procedures in dental office are with immune compromised host and high risk patients of endocarditis cardiopathies.

2.3. Antibiotics with special care in dentistry

The conservative utilization of antibiotics ought to be adhered especially for renal and liver transplant and pregnant patients vulnerable to infection[1]. Absorption and exclusion of certain drugs are unwonted in renal impairment patients. Amendments of dosage are mandatory and desired with such deteriorated kidney function. Dose amendments are imperative in patients with renal failure to evade aggrandized plasma drug accumulation[25]. Penicillins, clindamycin and cephalosporins can be prescribed at the regular doses, and are proposed to be the admissible antibiotics of preference[1]. Precisely, antibiotic regimen is advised for the renal transplant patients during the initial months, even when a routine dental check up or a minor treatment is undertaken as bacterial contamination is effectively controlled by implementation of the antibiotic therapy. The liver transplant patients demand considerable dose amendments with respect to erythromycin, clindamycin and metronidazole[1]. The latter drug is acclaimed to amalgamate with alcohol and preferably averted by virtue of its disulfiram repercussion[26]. Beta-lactum antibiotics (penicillin, ampicillin, cephalexin, cefazolin, ceftriaxone) are subsisted to be safe drugs and routinely advocated owing to its broad spectrum activity[26]. In addition, the antibiotic regimen for liver transplant patients is encouraged corresponding to the perilousness of the contagions. The degree of contamination encountered during the dental operative procedures and the intensity of the liver ailment determines the necessity of antibiotic prophylaxis in these patients.

Pregnant women exhibit multifarious oral symptoms like gingival inflammation, dry mouth, periodontal

manifestations who thereby demand special care during dental treatment. The American Board of Pediatric Dentistry suggests the practice of seeking professional oral care, as a precautionary measure during the first trimester, thereby to elude the predicaments[27]. The second trimester is noted to be the safe period to exercise the minor atraumatic oral procedures such as scaling and restorative treatment[28]. The recommended guidelines recuperated from the literature pertinent to the indication of antibiotics during pregnancy vindicates that pregnant women with high risk of infective endocarditis should seek the aid of antibiotics, preceding the dental manoeuvre[29]. The usage of tetracycline is absolutely contraindicated by virtue of its staining characteristics produced on the neonatal teeth. Penicillin, clindamycin and cephalosporin are renowned to be standard drugs which are administered during pregnancy[1]. Besides, the dental practitioners should make efforts to delineate the treatment plan, before the implementation of oral care to avert the stress and anxiety amidst the dental maneuvers[30]. The dialectic behind the secure usage in these susceptible patients is to deduce the risk of developing resistance to present antibiotic therapies[8,31–35]. Antibiotics ought to be supported in risky patients, preferably to manage the ailment and avert the contagious diffusion of contagions[36,37]. Penicillins have been the drug of choice to be opted by the dental practitioners in their routine dental practice[38–42], or a relative drug notably amoxicillin[4,43–49], followed by metronidazole[44,45]. Consecutive drug in the mainstream is clindamycin, which is subsisted to be an alternative in patients allergic to penicillin[50]. Apart from the cautious application of antibiotics, consultation of the medical expert is mandatory before executing invasive dental procedures in these perilous patients[1,51–53].

3. Dialectics and consequences of antibiotics abuse

Dreadful ailments have been cured after the incipience of antibiotics in 1929, besides it also leads to cumbersome consequences by virtue of its misuse[1,3]. Practitioner's insufficient knowledge and awareness pertaining to the indications of antibiotics prove to be the causative elements for overusing the medicaments. The ancillary factor which urges the dental experts to misuse antibiotics is the personal requests of patients, to prescribe redundant dosages, thereby forced to do an unhealthy practice. Unwise prescription of antibiotics by the dentists precipitates the initiation of antibiotic resistance[4,39,54].

Anti microbial resistance (AMR) threatens to sweep us to the pre-antibiotic era and this information ought to be a loud wake up call for the entire health care specialties. Furthermore, antibiotic prescribing may be involved with unfavourable side effects ranging from gastrointestinal disturbances to fatal anaphylactic shock and development of resistance. Studies reveal that many oral microbes such as *Streptococcus* spp., *Prevotella* spp., *Fusobacteria* spp., *Haemophilus* spp., *Veillonella* spp., *Porphyromonas gingivalis*, *Aggregatibacter actinomycetem comitans*, and *Actinomyces* have attained resistance to multitudinal antibiotics[55,56]. The occurrence of AMR can be deduced by restricting the prescription, plausibly advocating only for certain cases ensuing the affirmation of culture and sensitivity analysis. Wistfully a cross sectional survey conducted among the dental experts updates that one fourth of the participants were not aware about the investigations[57]. Preference of the latter tests should be vested in clinical practice which ensures a healthy and ethical approach. The service of antibiotics in dental discipline should be contemplated as an adscititious therapy instead of a permanent treatment for the oral infections[1]. Supplemental factors to be cultivated during routine practice subsume the perpetuation of previous dental records and chiefly the data respective to the antibiotics prescribed. Collaterally, the patients should be instructed to precisely follow the advice of dental proficient's rather than taking advantage of counter sale medications.

4. Conclusion

Dentists commonly administer antibiotics, to restrain contagions and to handle the prevailing dental ailments. Their service is basically recommended as prophylaxis for risky patients with compromised immune system, intrusive oral surgical procedures, and to impede the systemic spread of the infection[58]. Recouped information from the literature strongly admits that the administration of antibiotics demands a rational application pertaining to dentistry. The required dosage, inmates present medical situation and surgical peril factors must be contemplated before the initiation of the regimen. Culture specimens should be performed, predominantly in patients exhibiting vulnerable contagions so as to elude the extraneous susceptibility of drugs[59]. Appropriate and correct use of antibiotics is indispensable to ensure that effective and safe treatment is available and practices that may enhance microbial resistance are avoided. Overlooking the drastic

increase in prescription of antibiotics, the irrational usage leads to false positive effects on both health and financial grounds[60]. Dental practitioners must become better educated about the judicious use of antibiotics and the dangers and cost of their overuse and misuse. Cultivating the mentioned prodigious protocols during antibiotic prescription in routine dental practice, could incredibly allay the growth of AMR and benefit the patient's well-being. The evidence and information contingent to dental implant procedures and medically compromised patients (coronary artery disease, breast cancer, penile prosthesis implantation) encountered in dental practice have to be discussed further.

5. Recommended guidelines

The authenticated protocols recuperated from the documented report are as follows:

Many of the endodontic infections demand a conservative and operative approach towards the management of periodontal and pulpal inflammation. The antibiotics are recommended preferably, considering the patient's medical status and the evidence of an extra-oral swelling.

Dental maneuvers are not the trigger factors for infective endocarditis; in the meantime the services of antibiotic prophylaxis are authenticated in patients with high risk of cardiopathies and imperil health.

Each and every minor oral surgical procedure does not require the support of antibiotic regimen. It's advocated principally on the account of ostectomy degree and patient's medical condition.

Communion with the medical specialist is imperative preceding the dental treatment in pregnant, lactating women, renal and liver transplant patients who are susceptible to contagions.

Administer antibiotics as a supplement rather than an ersatz for surgical technique.

Conflict of interest statement

We declare that we have no conflict of interest.

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